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File: EHA/HEER Office

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2006-154-RB

FROM: Roger Brewer
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THROUGH: Barbara Brooks
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DATE: March 16, 2006

SUBJECT: Review of *Technical Memorandum For Evaluating Sites In Hawai'i and Guam With Soils Impacted by Chlordane* (February 2006)

I reviewed the report *Technical Memorandum For Evaluating Sites In Hawai'i and Guam With Soils Impacted by Chlordane* (February 2006, Rev: 03) prepared the Navy Environmental Health Center. Overall, the memorandum reflects recent discussions we have had with the Navy and should prove very useful once finalized. Some important clarifications and edits are recommended, however, as discussed below. In particular, the issue of home gardens and produce uptake of chlordane, heptachlor and heptachlor epoxide is not considered in the proposed screening levels. Comment #8 recommends the importation of clean fill for any future garden areas.

1. **Summarize parameter values used in each exposure scenario in a table attached to the memorandum, include a summary of screening levels for noncancer concerns for comparison.** The target risk used to calculate screening levels for each compound under each exposure scenario is apparently 3.33×10^{-6} (i.e., cumulative cancer risk from chlordane, heptachlor and heptachlor epoxide = 1×10^{-5}), although this is not clear in the memorandum. I was able to reproduce the screening levels for residential exposure but not for the other scenarios. I'm not sure what the differences are in exposure parameter values with respect to the USEPA PRG models they reference.

2. **Table 2 (and related text). Use "Lot Size" instead of "Structure".** "Structure" generally refers to a building, rather than the ground that the building is sitting on. Use of the term in Table 2 could be misinterpreted to mean the floor space of the building, rather than the size of the lot under investigation.

3. **Recommend collection of multi-increment samples across lots rather than composite samples collected at random locations.** Multi-increment sampling provides a better estimate of the average concentration of contaminants in soil and is becoming a regular part of site investigations overseen by the HEER office.

4. **Provide guidance on property scenarios that would require use of specific screening levels.** The use of specific screening levels under different site scenarios is not clear. For example, based on the screening levels in Table 2, the top two feet of soil at commercial/industrial sites should presumably meet a chlordane screening level for construction worker exposure (e.g., 39.9 mg/kg - I get 43 mg/kg based on my calculations and assumed exposure parameter values). Note that HDOH uses a less conservative exposure assumptions for construction and utility workers than referenced in the Navy document (e.g., ED = 7 years, EF = 20 days/year, Soil Ingestion Rate = 330 mg/day; refer to May 2005 EAL guidance document).

5. **Provide a maximum concentration of chlordane and related pesticides for soil that can be left in place below a depth of two feet.** Placement of a cap of clean fill should not be used to justify leaving soil with an unlimited concentration of chlordane and related pesticides in place. Deeper soil should presumably meet screening levels for utility workers, at a minimum.

6. **Recommend that utility corridors be backfilled with clean fill.** This is encouraged to reduce worker exposure and to avoid excavation of contaminated soil from utility trenches during routine maintenance activities and inadvertent reuse in other areas.

7. **Include residential screening levels for unrestricted future land use.** Residential screening levels in the memorandum are based on an assumption that Navy personnel residents will not live at a base with chlordane-contaminated soil for more than six years. While this may be appropriate under current base rotation schedules, it places a restriction on future use of the property that should be clearly documented. Additional review will be required if Navy or private sector personnel are allowed to live on the property for longer period in the future. Comparison of site data to screening levels for unrestricted land use (e.g., total residential exposure 30 years) would be useful to identify properties that do not need to be re-evaluated in the future. This may also help identify sites that can be easily remediated to unrestricted land use at the time they are discovered.

8. **Recommend importation of at least two feet of clean fill in areas to be used for home or community gardens.** This is intended to address the potential disturbance of deeper soils during gardening activities as well as limit potential uptake of chlordane in produce (not evaluated in detail). A minimum two-foot cap is consistent with USEPA guidance for lead contaminated soils in garden areas (USEPA 2003).

The USEPA and Massachusetts DEP have prepared guidance documents for the potential uptake of contaminants in home grown produce (USEPA 1997, MADEP 1995). Plant uptake factors for chlordane have also been published (e.g., Mattina 2004). Based on an in-house spreadsheet that combines the USEPA and MADEP models, the cumulative excess cancer risk posed by the uptake of chlordane could approach $1x10^{-4}$ and a Hazard Index of

approximately 2.0 for produce grown in soil with concentrations of chlordane, heptachlor and heptachlor epoxide at typical method reporting limits (USEPA gardener scenario). Using the same model, the health risk posed by produce grown in soil at the residential screening levels in Table 2 could exceed a cumulative, excess cancer rate of $>1x10^{-3}$ and a Hazard Index of 60. Unless justified in a more detailed, site-specific assessment, clean fill for garden purposes should therefore be defined as soil in which chlordane, heptachlor and heptachlor epoxide are not detected above typical method reporting levels for commercial laboratories (e.g., 0.03 mg/kg).

References:

HIDOH, 2005, *Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater*: Hawai'i Department of Health, Environmental Management Division.

MADEP, 1995, Guidance for Disposal Site Risk Characterization; Massachusetts Department of Environmental Protection, Interim Final Policy WSC/ORS-95-141, July 1995.

Mattina, 2004, Plant Uptake and Translocation of Highly Weathered, Soil-Bound Technical Chlordane Residues: Data From Field And Rhizotron Studies, Environmental Toxicology and Chemistry, Vol. 23, No. 11, pp. 2756–2762.

USEPA, 1997, *Exposure Factors Handbook*: U.S. Environmental Protection Agency, Office of Research and Development, Publication EPA/600/P-95/002Fa, August 1997.